FIG. 1

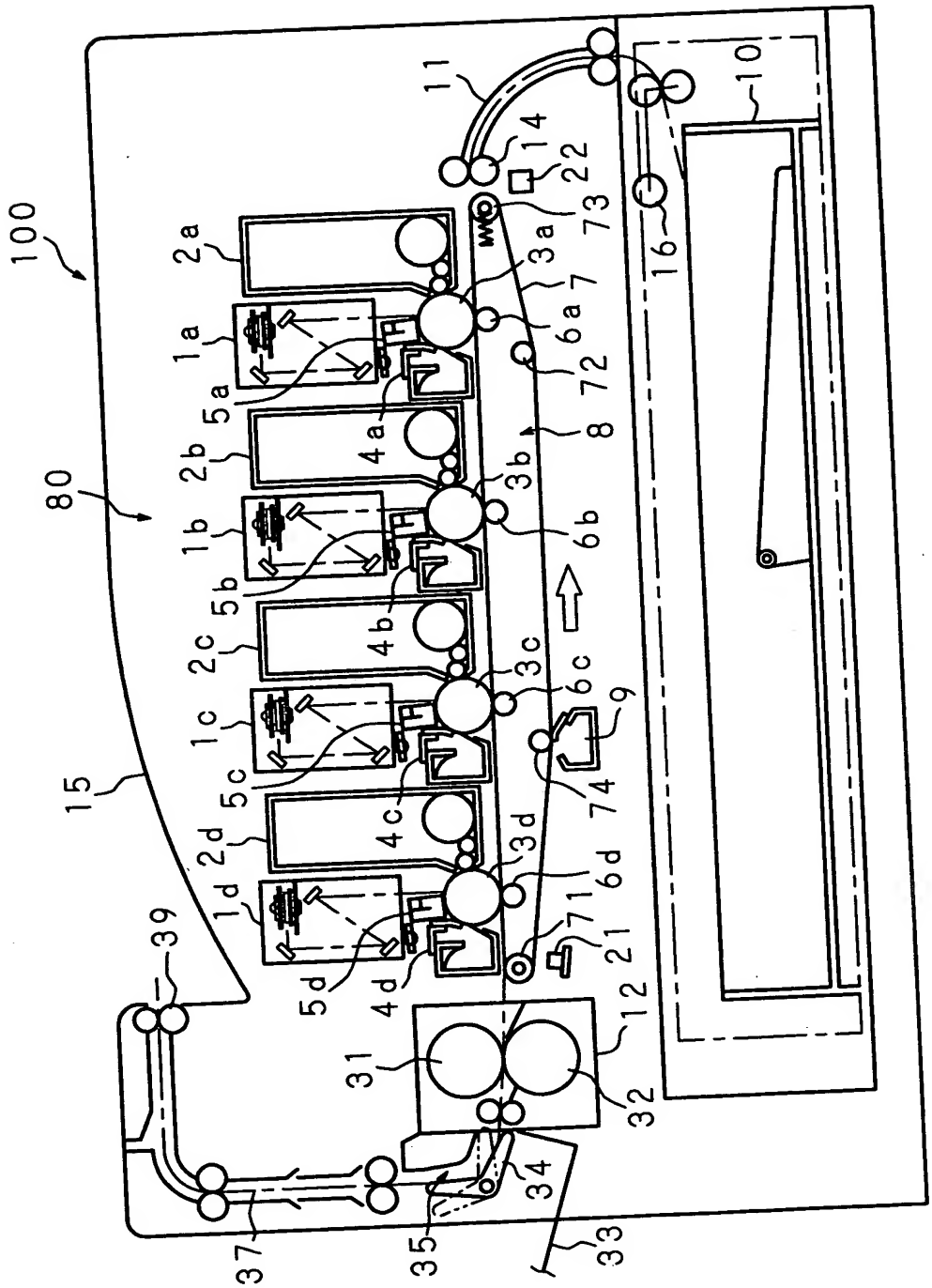

100
80
15
11
10
14
22
73
16
2a
1a
5a
3a
7
6a
72
8
4a
2b
1b
5b
3b
6b
4b
2c
1c
5c
3c
6c
9
74
4c
2d
1d
5d
3d
6d
71
21
12
39
4d
31
32
34
35
37
33

FIG. 2

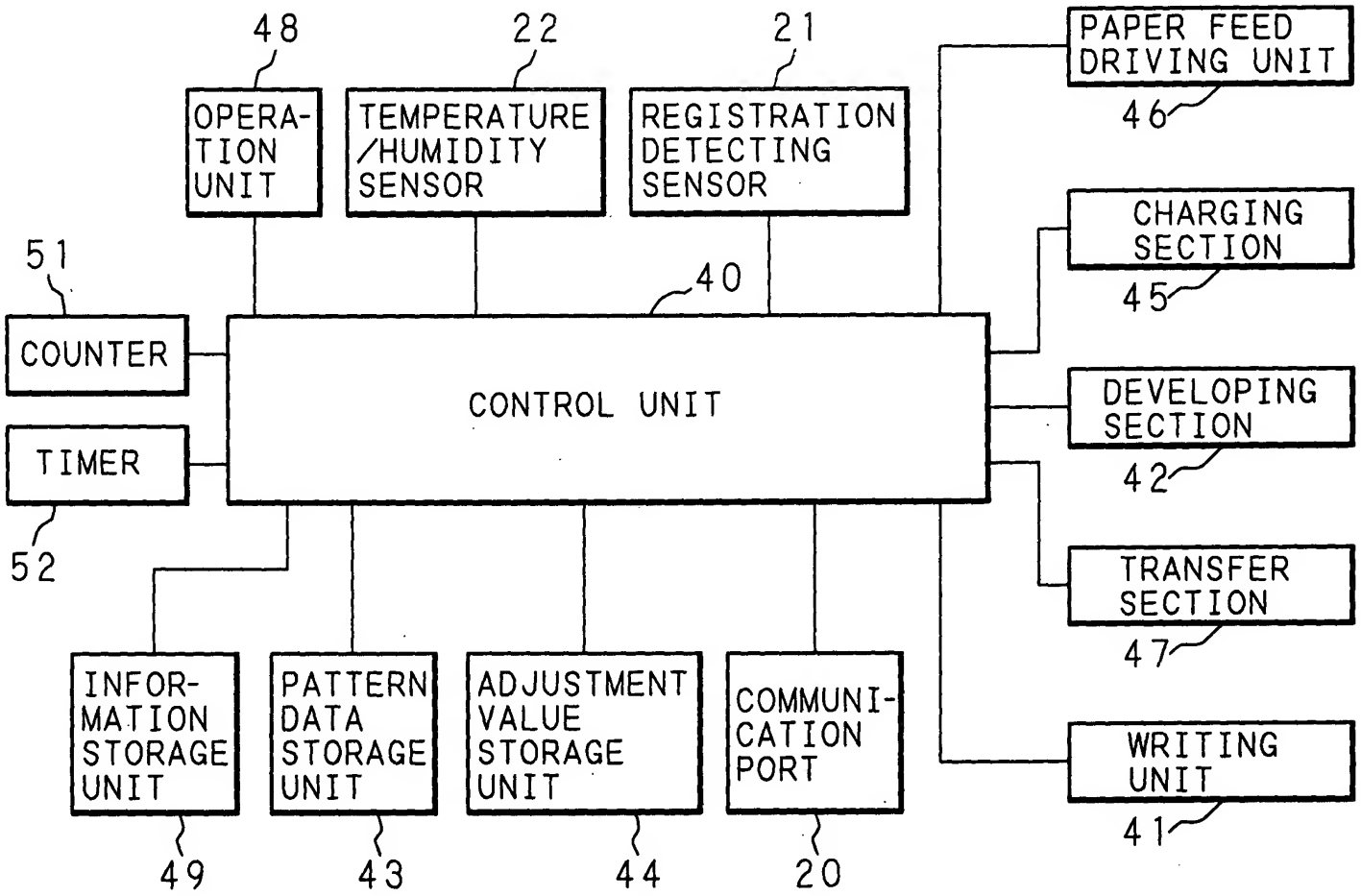

48
22
21
OPERATION UNIT
TEMPERATURE /HUMIDITY SENSOR
REGISTRATION DETECTING SENSOR
PAPER FEED DRIVING UNIT
46
CHARGING SECTION
45
51
40
COUNTER
CONTROL UNIT
DEVELOPING SECTION
42
TIMER
52
TRANSFER SECTION
47
INFORMATION STORAGE UNIT
PATTERN DATA STORAGE UNIT
ADJUSTMENT VALUE STORAGE UNIT
COMMUNICATION PORT
WRITING UNIT
41
49
43
44
20

FIG. 3

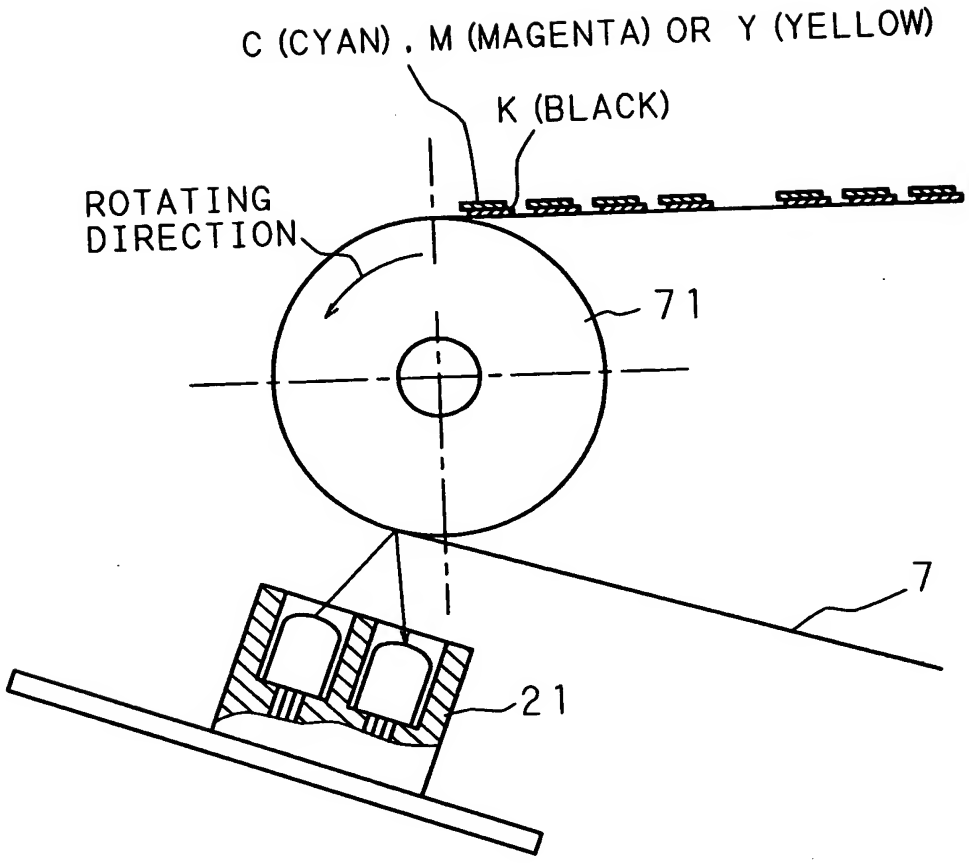

C (CYAN) , M (MAGENTA) OR Y (YELLOW)
K (BLACK)
ROTATING DIRECTION
71
7
21

FIG. 4

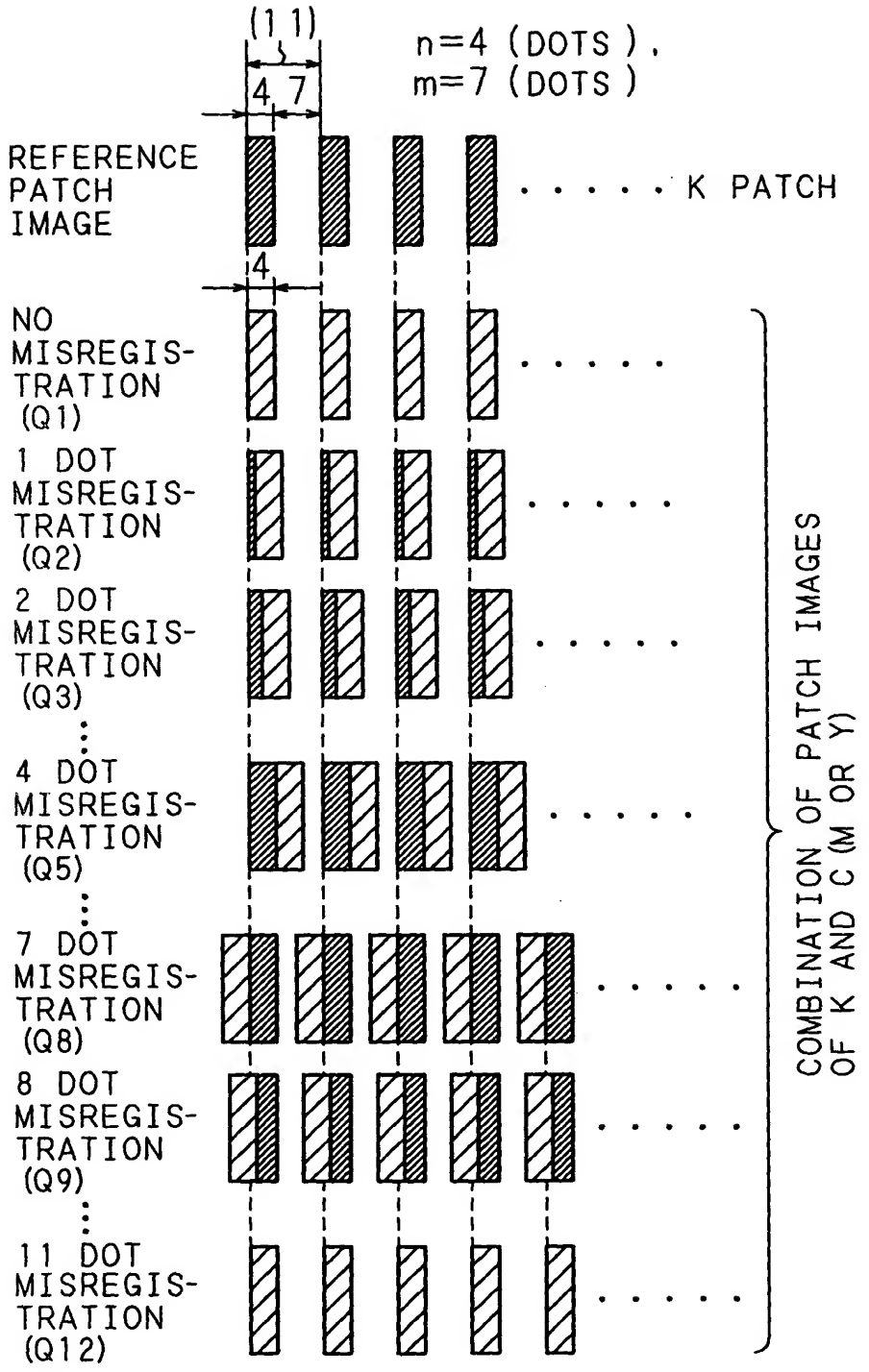

(1,1)
4
7
n=4 (DOTS),
m=7 (DOTS)
REFERENCE PATCH IMAGE
K PATCH
4
NO MISREGIS-TRATION (Q1)
1 DOT MISREGIS-TRATION (Q2)
2 DOT MISREGIS-TRATION (Q3)
4 DOT MISREGIS-TRATION (Q5)
7 DOT MISREGIS-TRATION (Q8)
8 DOT MISREGIS-TRATION (Q9)
11 DOT MISREGIS-TRATION (Q12)
COMBINATION OF PATCH IMAGES OF K AND C (M OR Y)

FIG. 5

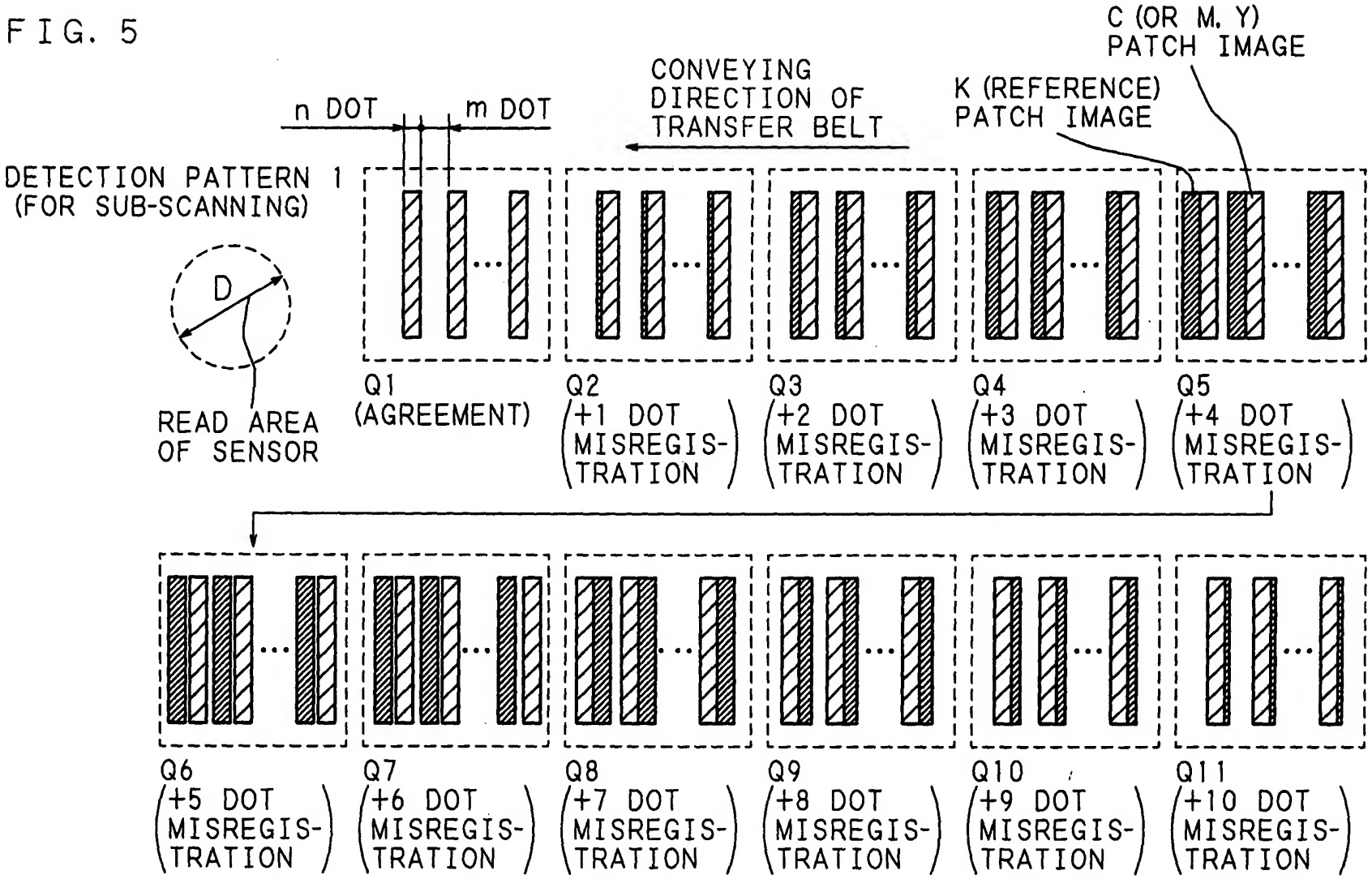

C (OR M, Y)
PATCH IMAGE
CONVEYING
DIRECTION OF
TRANSFER BELT
K (REFERENCE)
PATCH IMAGE
n DOT
m DOT
DETECTION PATTERN 1
(FOR SUB-SCANNING)
D
READ AREA
OF SENSOR
Q1
(AGREEMENT)
Q2
(+1 DOT
MISREGIS-
TRATION
Q3
(+2 DOT
MISREGIS-
TRATION
Q4
(+3 DOT
MISREGIS-
TRATION
Q5
(+4 DOT
MISREGIS-
TRATION
Q6
(+5 DOT
MISREGIS-
TRATION
Q7
(+6 DOT
MISREGIS-
TRATION
Q8
(+7 DOT
MISREGIS-
TRATION
Q9
(+8 DOT
MISREGIS-
TRATION
Q10
(+9 DOT
MISREGIS-
TRATION
Q11
(+10 DOT
MISREGIS-
TRATION

FIG. 6

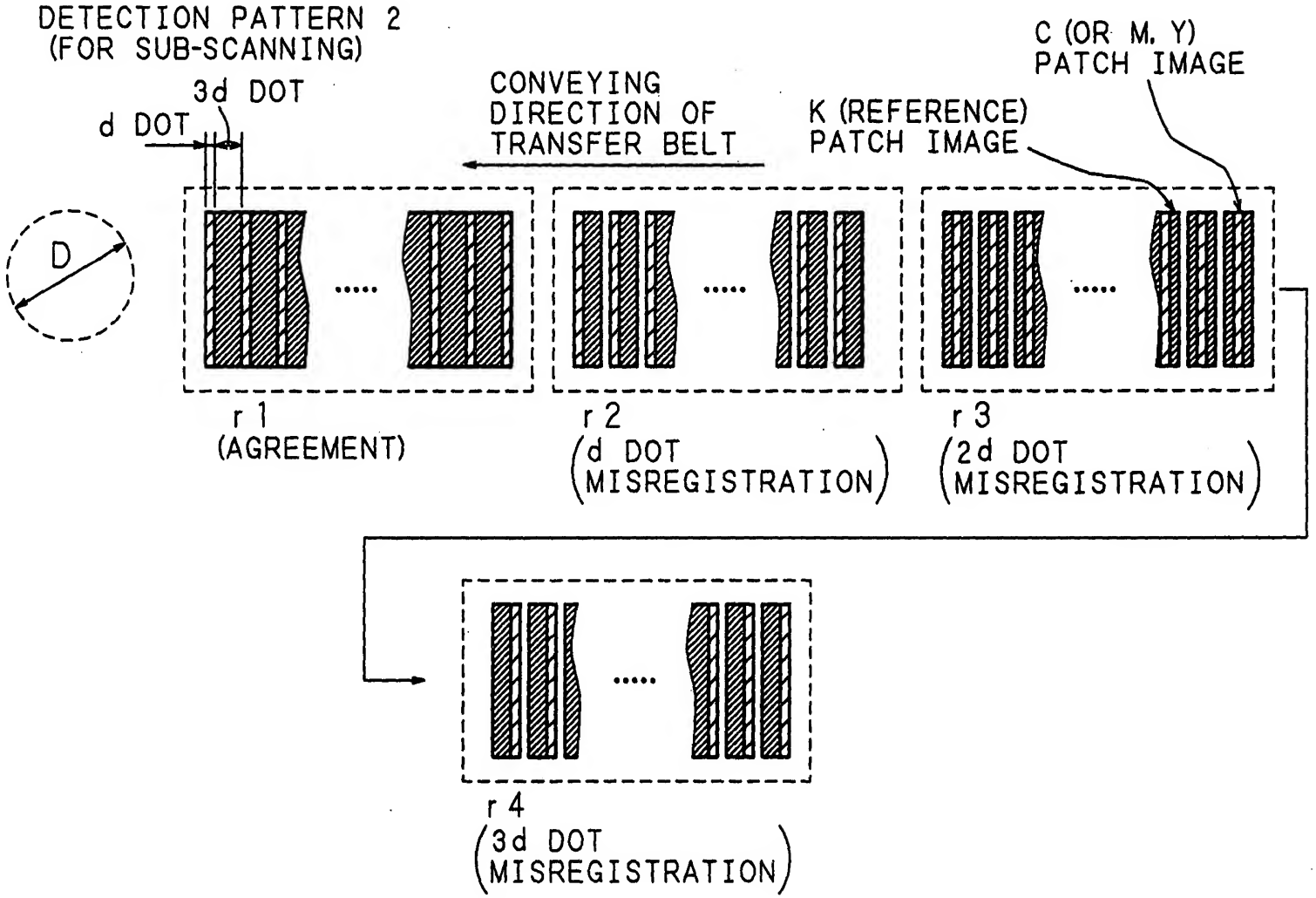

DETECTION PATTERN 2
(FOR SUB-SCANNING)
3d DOT
d DOT
D
CONVEYING
DIRECTION OF
TRANSFER BELT
K (REFERENCE)
PATCH IMAGE
C (OR M, Y)
PATCH IMAGE
r 1
(AGREEMENT)
r 2
(d DOT
MISREGISTRATION)
r 3
(2d DOT
MISREGISTRATION)
r 4
(3d DOT
MISREGISTRATION)

FIG. 7

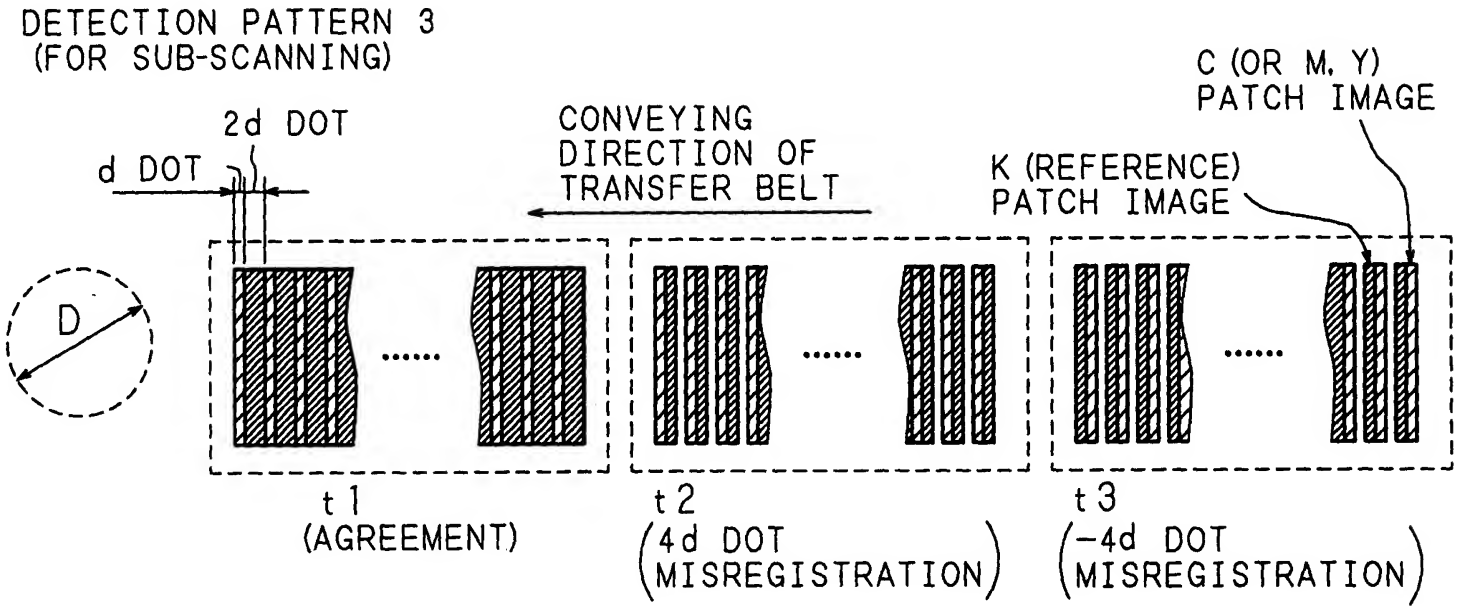

DETECTION PATTERN 3
(FOR SUB-SCANNING)
2d DOT
d DOT
CONVEYING
DIRECTION OF
TRANSFER BELT
C (OR M, Y)
PATCH IMAGE
K (REFERENCE)
PATCH IMAGE
D
t 1
(AGREEMENT)
t 2
(4d DOT
MISREGISTRATION)
t 3
(−4d DOT
MISREGISTRATION)

FIG. 8 (a)

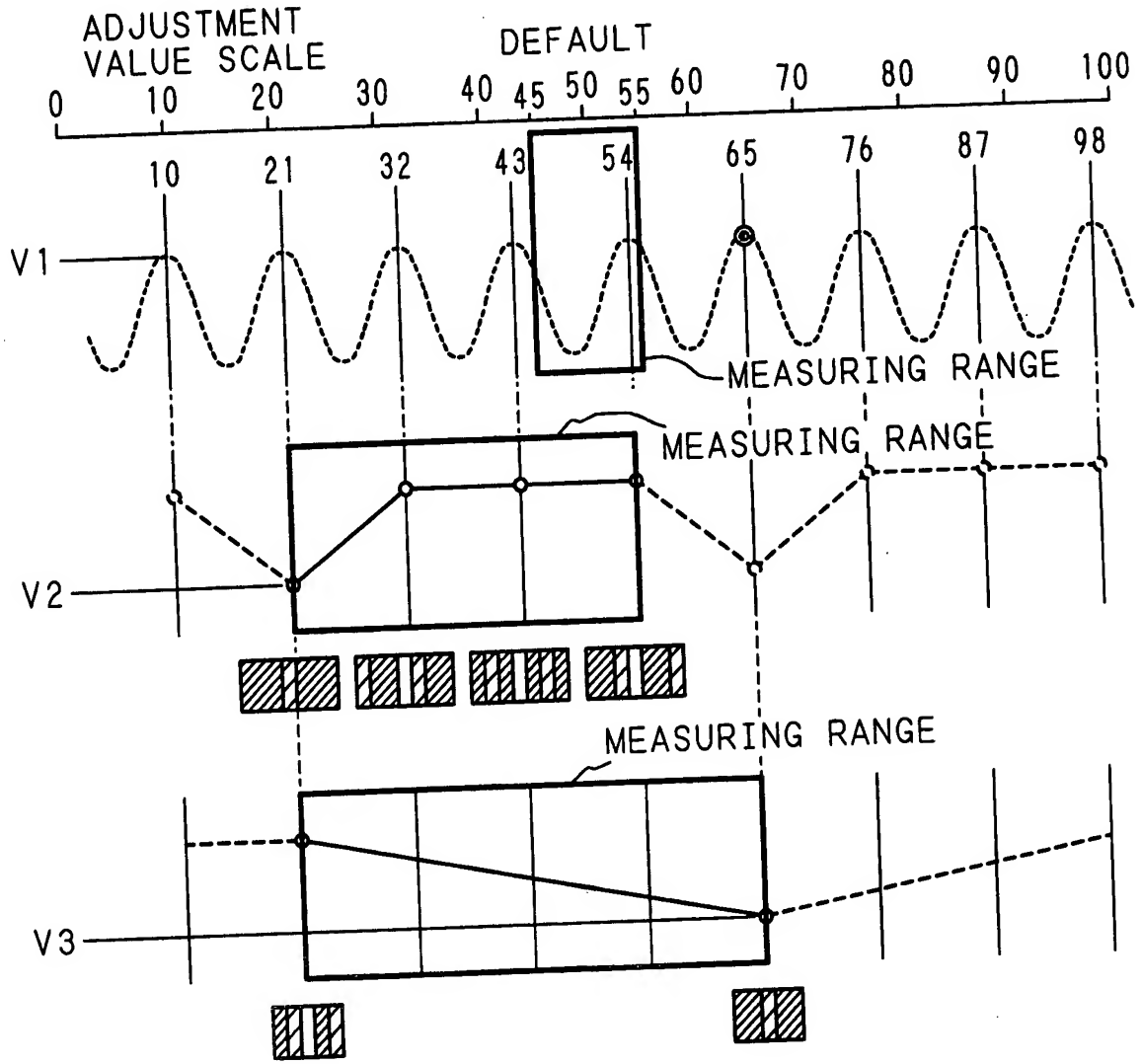



FIG. 8 (b)

FIG. 8 (c)

FIG. 9

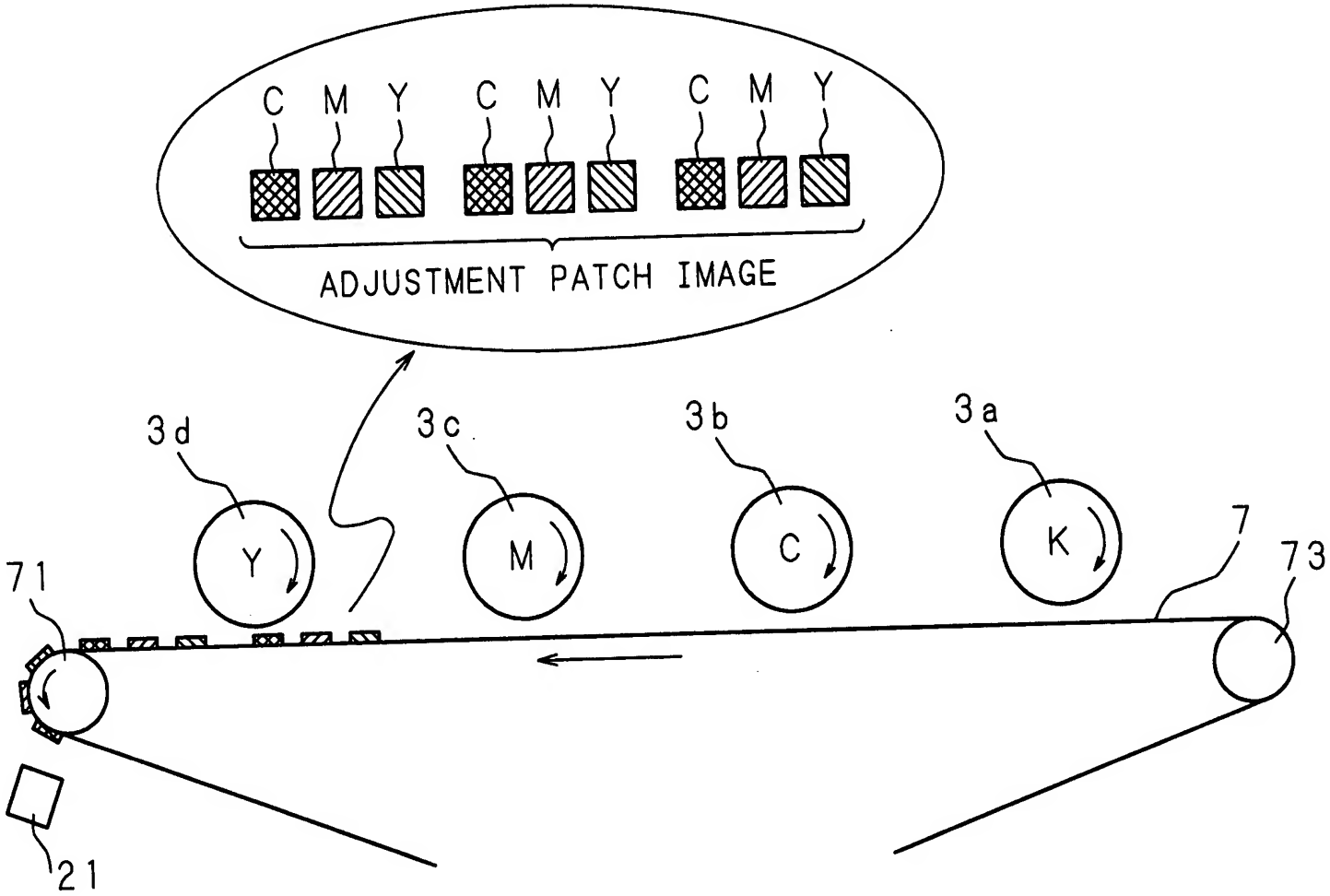


FIG. 10

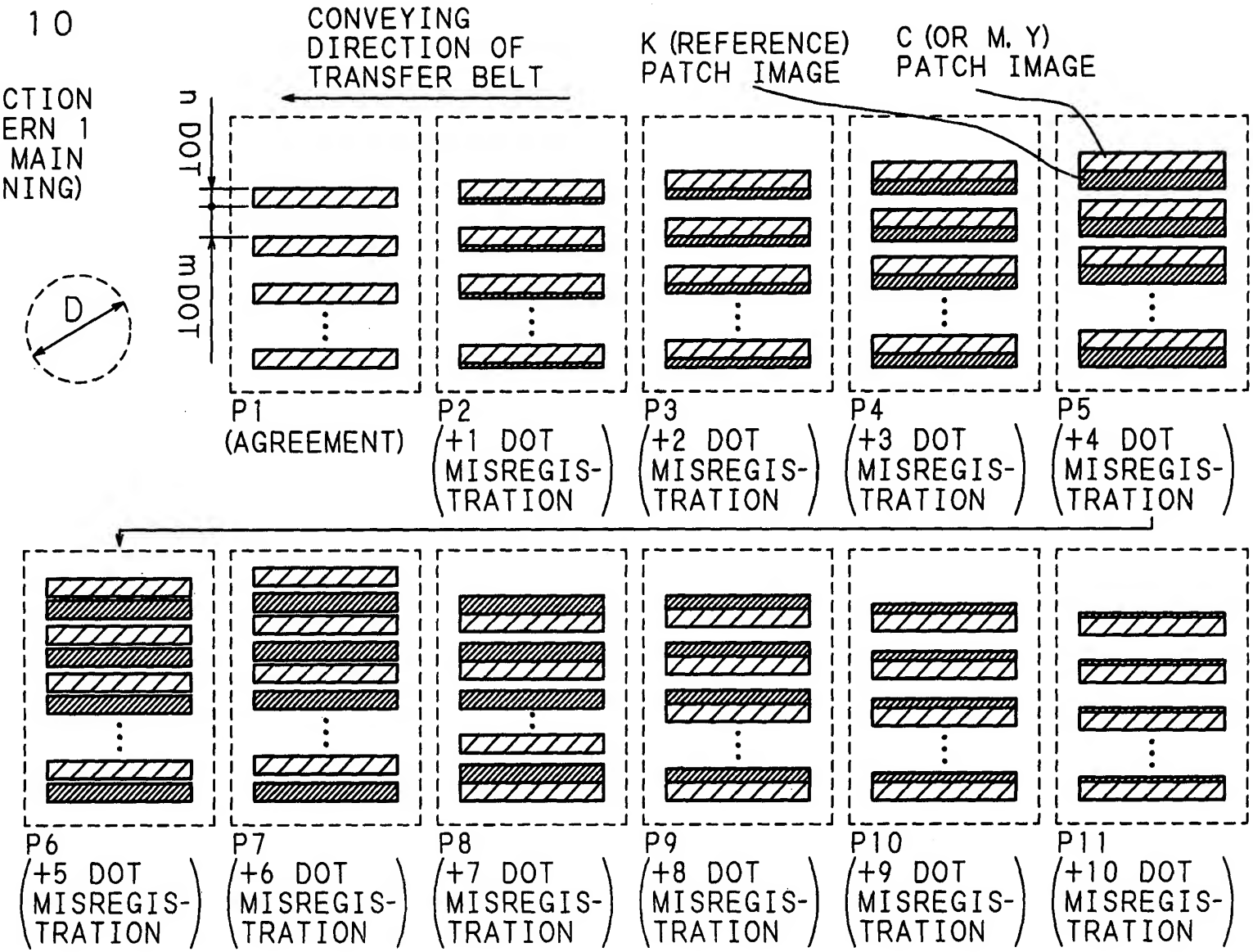

CONVEYING DIRECTION OF TRANSFER BELT
K (REFERENCE) PATCH IMAGE
C (OR M, Y) PATCH IMAGE
DETECTION PATTERN 1 (FOR MAIN SCANNING)
n DOT
m DOT
D
P1 (AGREEMENT)
P2 (+1 DOT MISREGISTRATION)
P3 (+2 DOT MISREGISTRATION)
P4 (+3 DOT MISREGISTRATION)
P5 (+4 DOT MISREGISTRATION)
P6 (+5 DOT MISREGISTRATION)
P7 (+6 DOT MISREGISTRATION)
P8 (+7 DOT MISREGISTRATION)
P9 (+8 DOT MISREGISTRATION)
P10 (+9 DOT MISREGISTRATION)
P11 (+10 DOT MISREGISTRATION)

FIG. 11

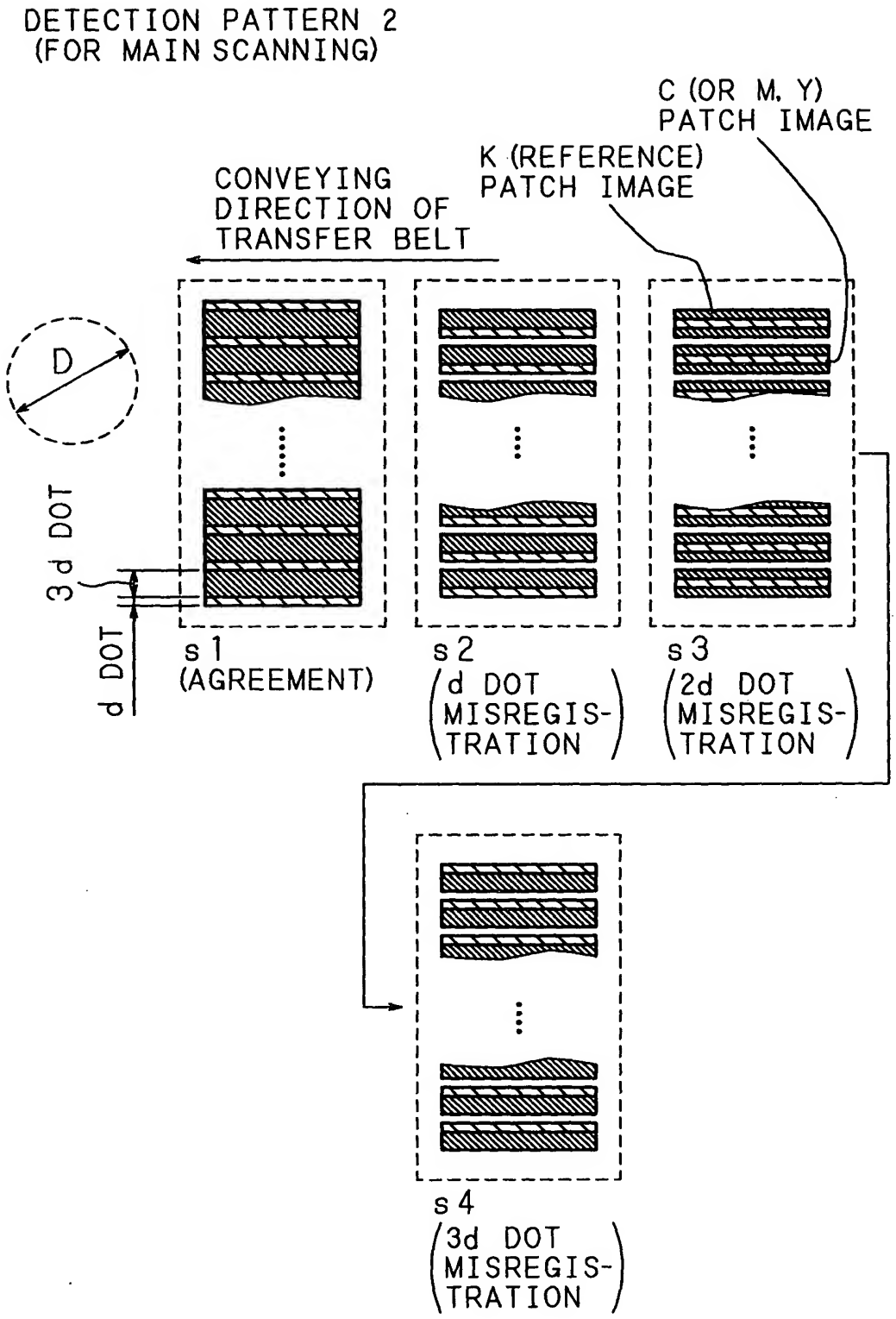

DETECTION PATTERN 2
(FOR MAIN SCANNING)
C (OR M, Y)
PATCH IMAGE
K (REFERENCE)
PATCH IMAGE
CONVEYING
DIRECTION OF
TRANSFER BELT
D
3d DOT
d DOT
s 1
(AGREEMENT)
s 2
(d DOT
MISREGIS-
TRATION
s 3
(2d DOT
MISREGIS-
TRATION
s 4
(3d DOT
MISREGIS-
TRATION

FIG. 12

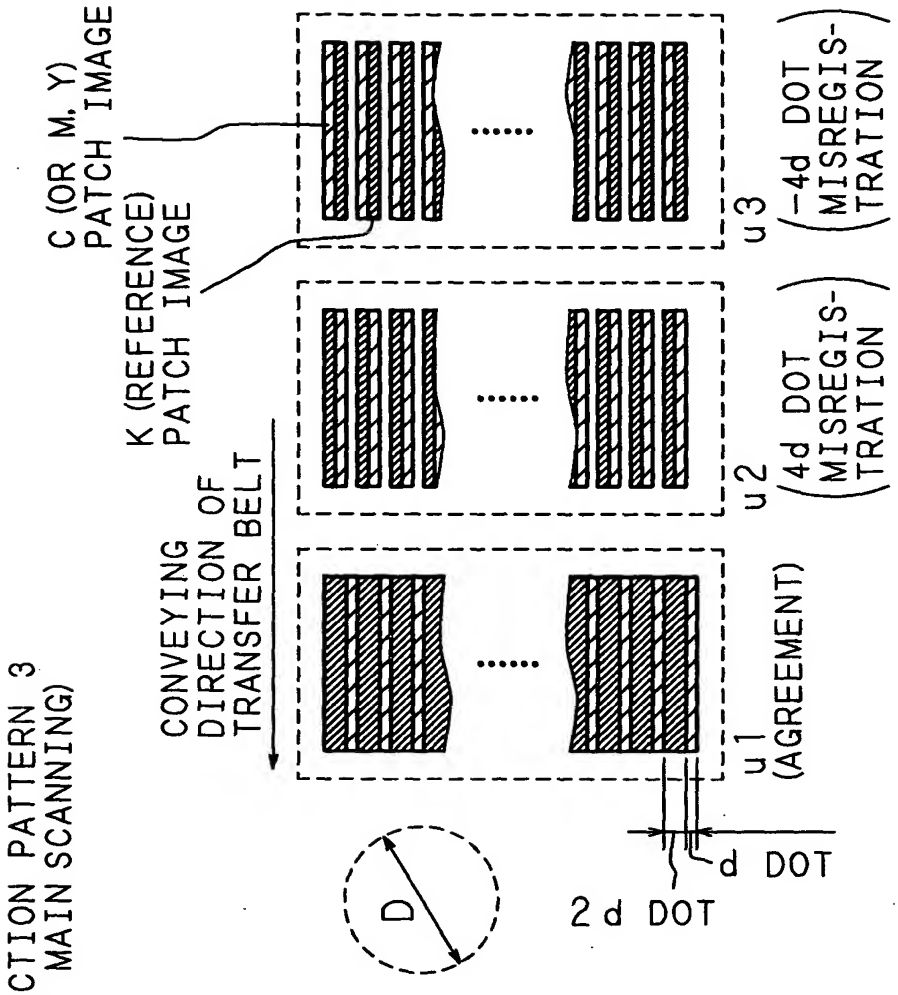

DETECTION PATTERN 3
(FOR MAIN SCANNING)
C (OR M, Y)
PATCH IMAGE
K (REFERENCE)
PATCH IMAGE
CONVEYING
DIRECTION OF
TRANSFER BELT
u3
(-4d DOT
MISREGIS-
TRATION
u2
(4d DOT
MISREGIS-
TRATION
u1
(AGREEMENT)
d DOT
2d DOT
D

FIG. 13

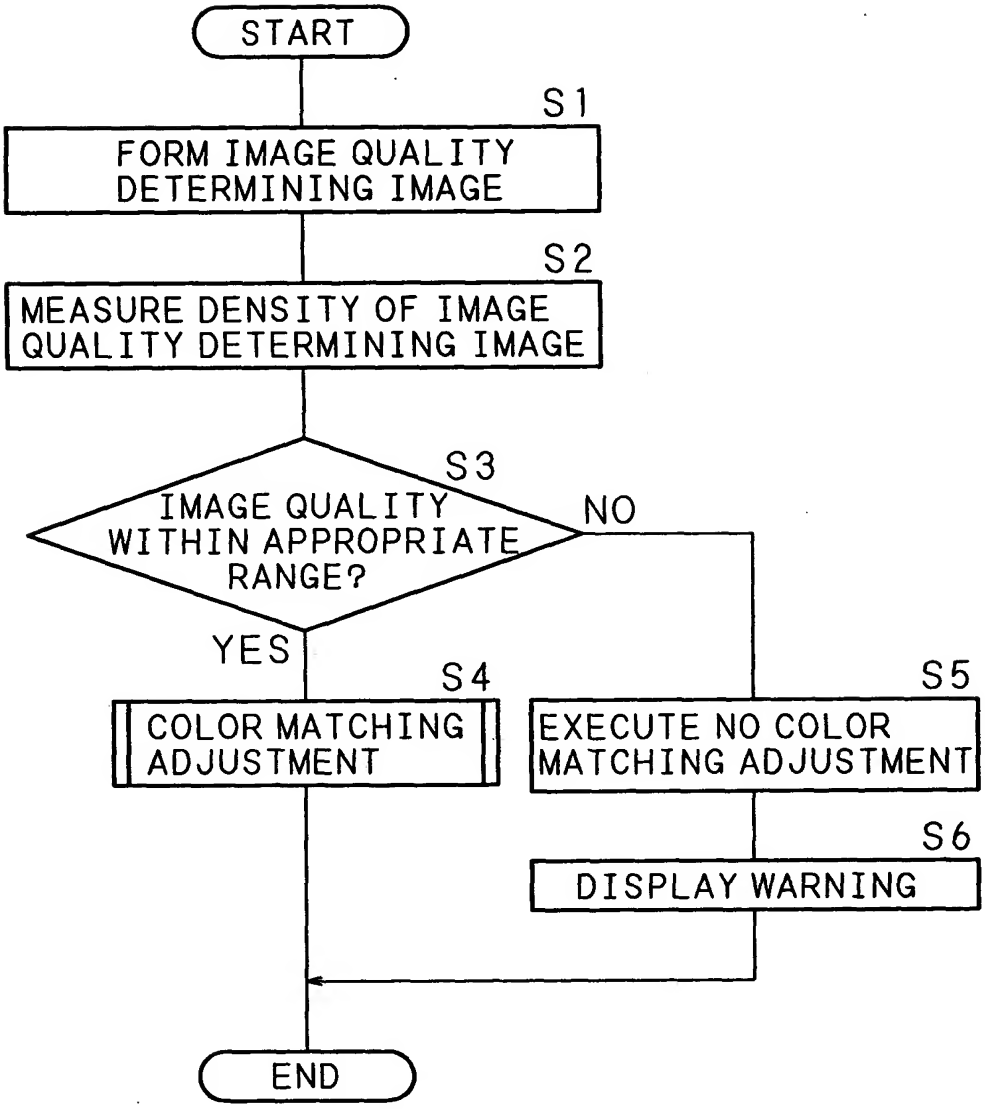

START
S1
FORM IMAGE QUALITY DETERMINING IMAGE
S2
MEASURE DENSITY OF IMAGE QUALITY DETERMINING IMAGE
S3
IMAGE QUALITY WITHIN APPROPRIATE RANGE?
NO
YES
S4
COLOR MATCHING ADJUSTMENT
S5
EXECUTE NO COLOR MATCHING ADJUSTMENT
S6
DISPLAY WARNING
END

FIG. 14

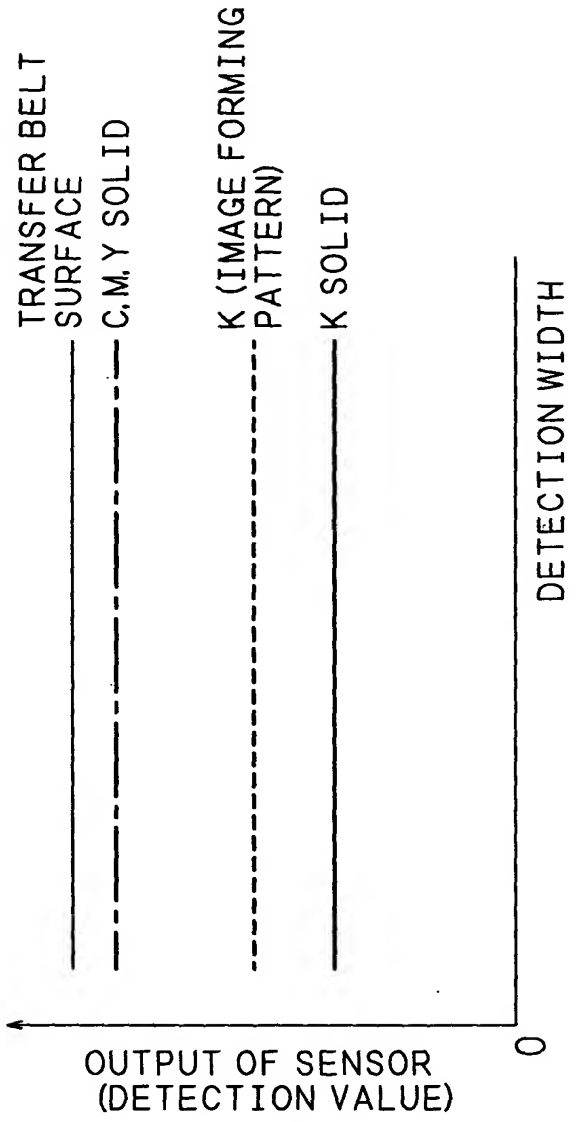

TRANSFER BELT SURFACE
C.M.Y SOLID
K (IMAGE FORMING PATTERN)
K SOLID
DETECTION WIDTH
0
OUTPUT OF SENSOR (DETECTION VALUE)

FIG. 15

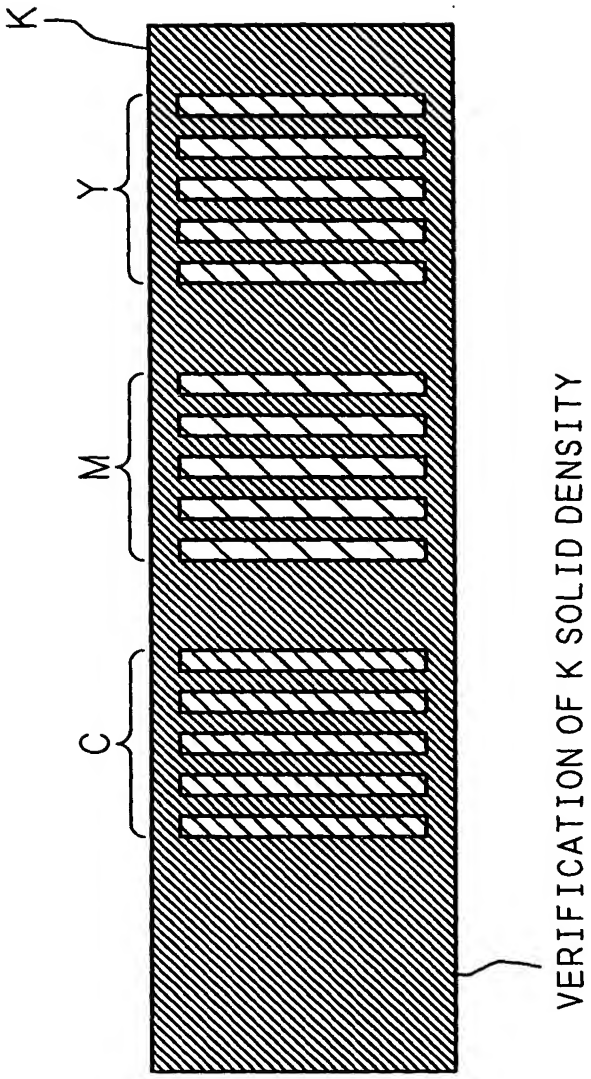


FIG. 16

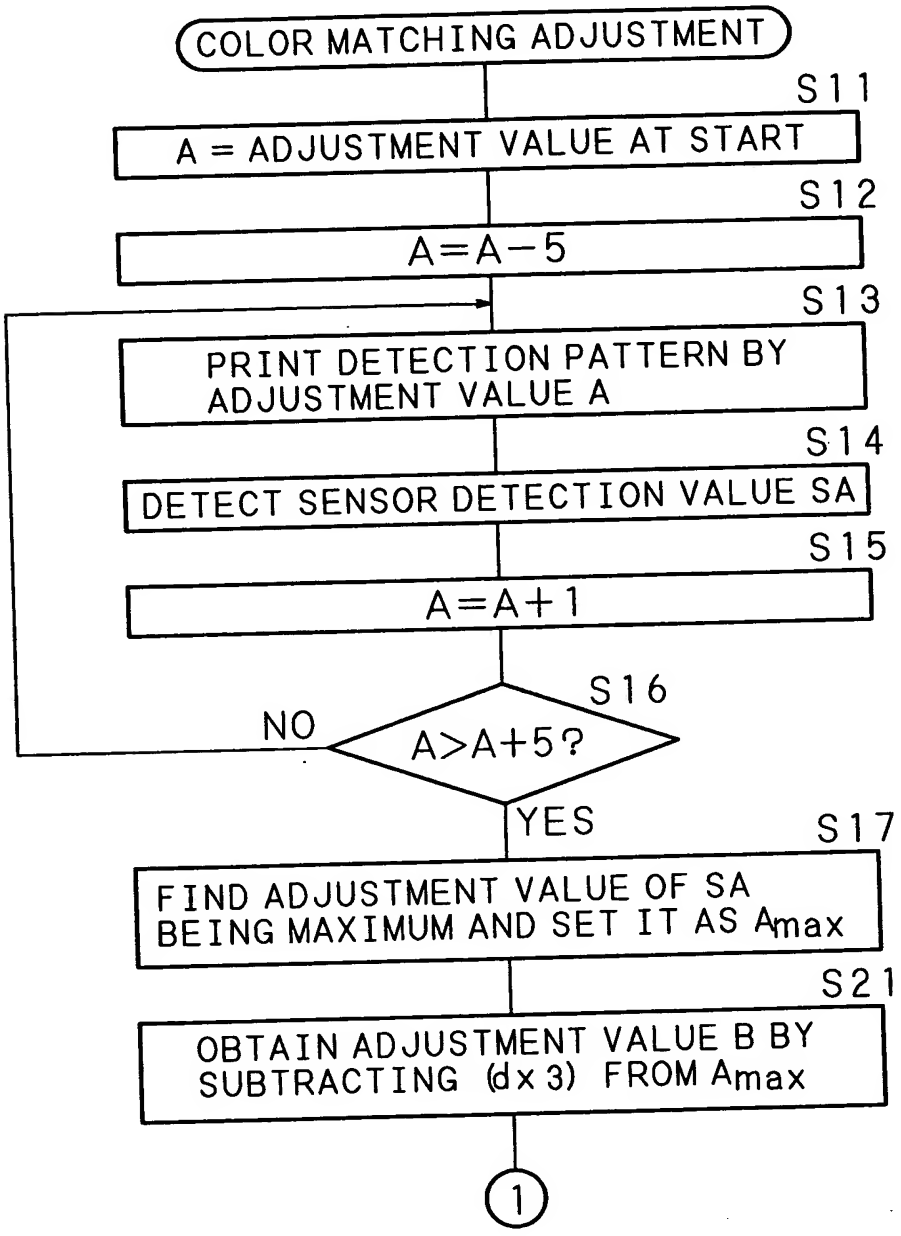

COLOR MATCHING ADJUSTMENT
S11
A = ADJUSTMENT VALUE AT START
S12
A=A−5
S13
PRINT DETECTION PATTERN BY ADJUSTMENT VALUE A
S14
DETECT SENSOR DETECTION VALUE SA
S15
A=A+1
S16
NO
A>A+5?
YES
S17
FIND ADJUSTMENT VALUE OF SA BEING MAXIMUM AND SET IT AS Amax
S21
OBTAIN ADJUSTMENT VALUE B BY SUBTRACTING (dx3) FROM Amax
1

FIG. 17

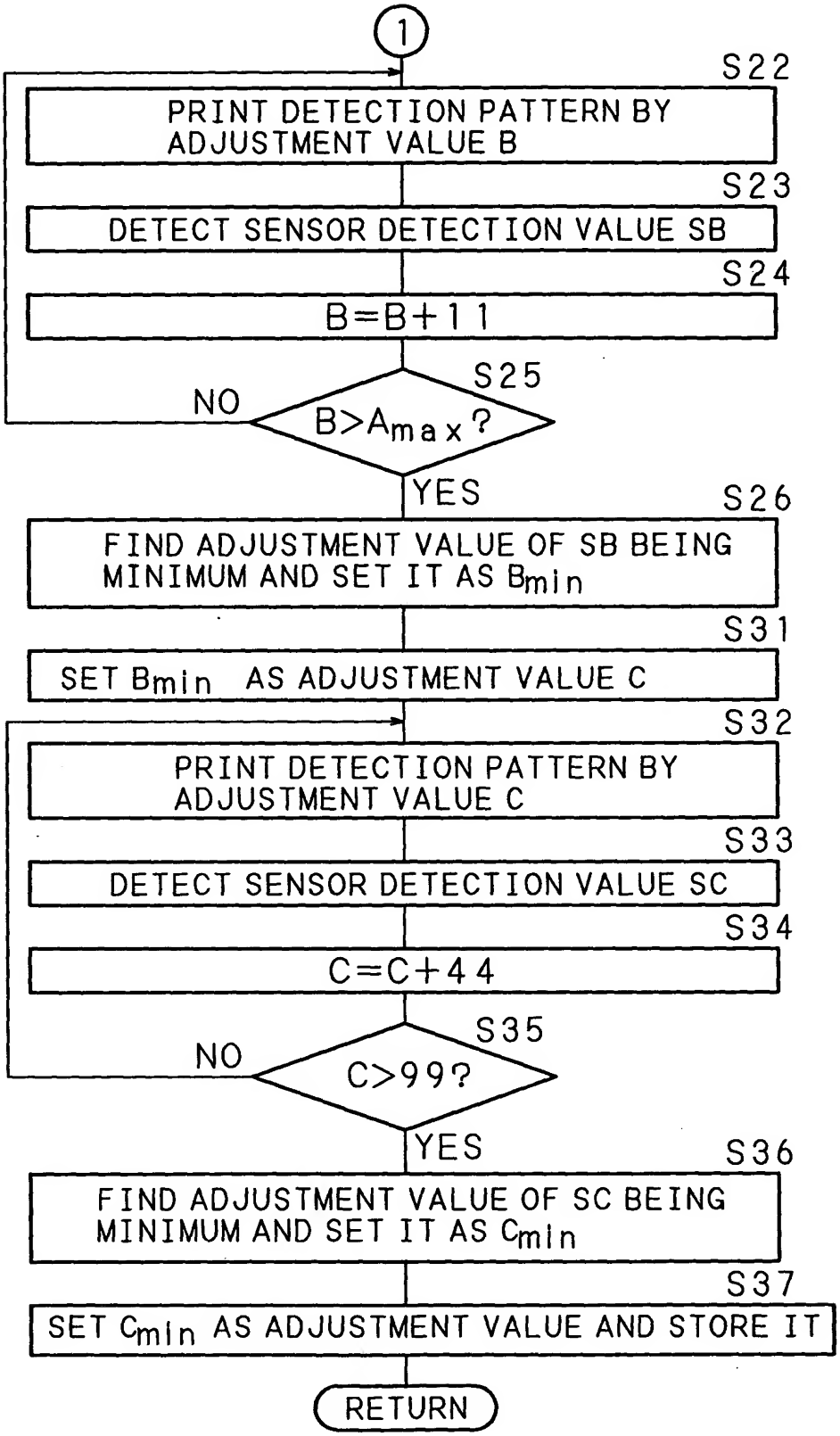

1
S22
PRINT DETECTION PATTERN BY ADJUSTMENT VALUE B
S23
DETECT SENSOR DETECTION VALUE SB
S24
B=B+11
S25
NO
B>Amax?
YES
S26
FIND ADJUSTMENT VALUE OF SB BEING MINIMUM AND SET IT AS Bmin
S31
SET Bmin AS ADJUSTMENT VALUE C
S32
PRINT DETECTION PATTERN BY ADJUSTMENT VALUE C
S33
DETECT SENSOR DETECTION VALUE SC
S34
C=C+44
S35
NO
C>99?
YES
S36
FIND ADJUSTMENT VALUE OF SC BEING MINIMUM AND SET IT AS Cmin
S37
SET Cmin AS ADJUSTMENT VALUE AND STORE IT
RETURN

FIG. 18

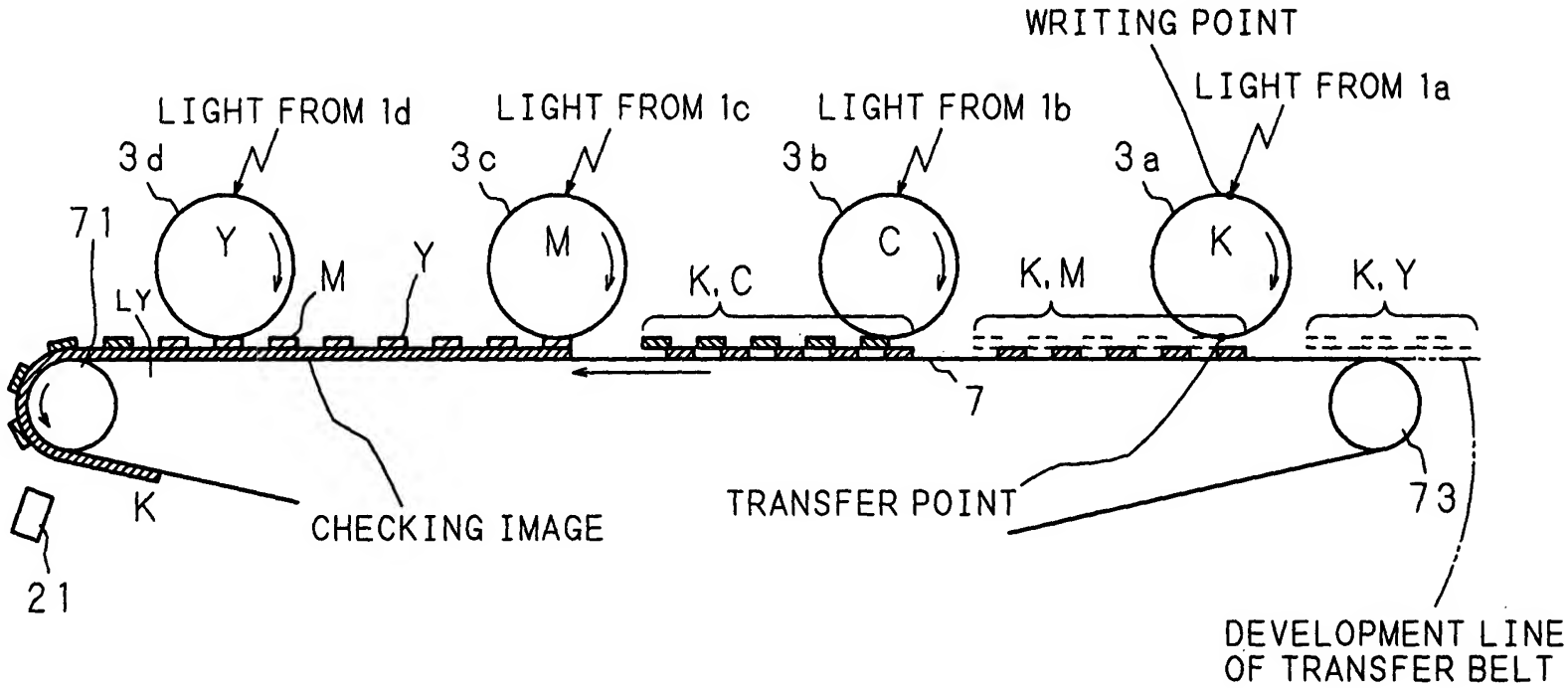

WRITING POINT
LIGHT FROM 1d
LIGHT FROM 1c
LIGHT FROM 1b
LIGHT FROM 1a
3d
3c
3b
3a
71
Y
M
C
K
LY
M
Y
K, C
K, M
K, Y
7
K
CHECKING IMAGE
TRANSFER POINT
73
21
DEVELOPMENT LINE
OF TRANSFER BELT

FIG. 19

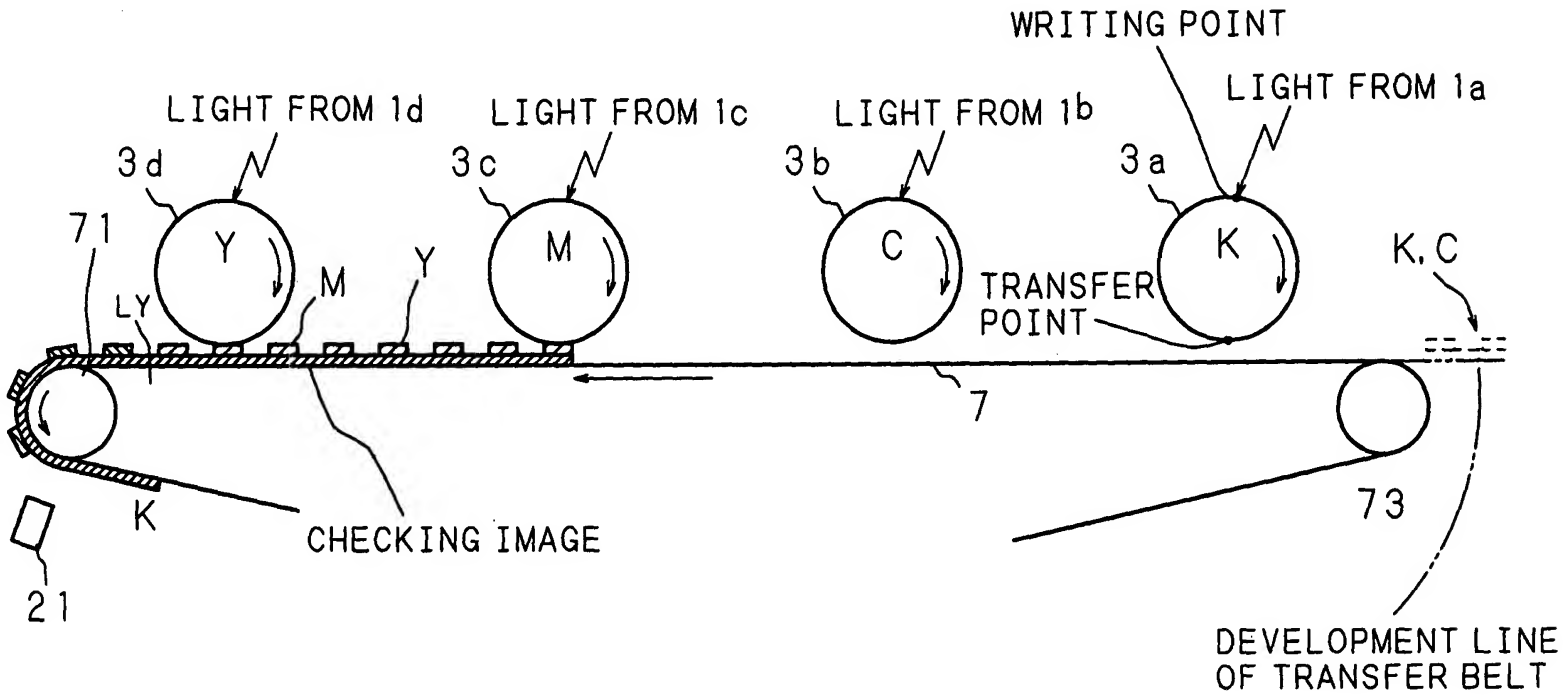

WRITING POINT
LIGHT FROM 1d
LIGHT FROM 1c
LIGHT FROM 1b
LIGHT FROM 1a
3d
3c
3b
3a
71
Y
M
C
K
K, C
LY
M
Y
TRANSFER POINT
7
73
K
CHECKING IMAGE
21
DEVELOPMENT LINE OF TRANSFER BELT

FIG. 20

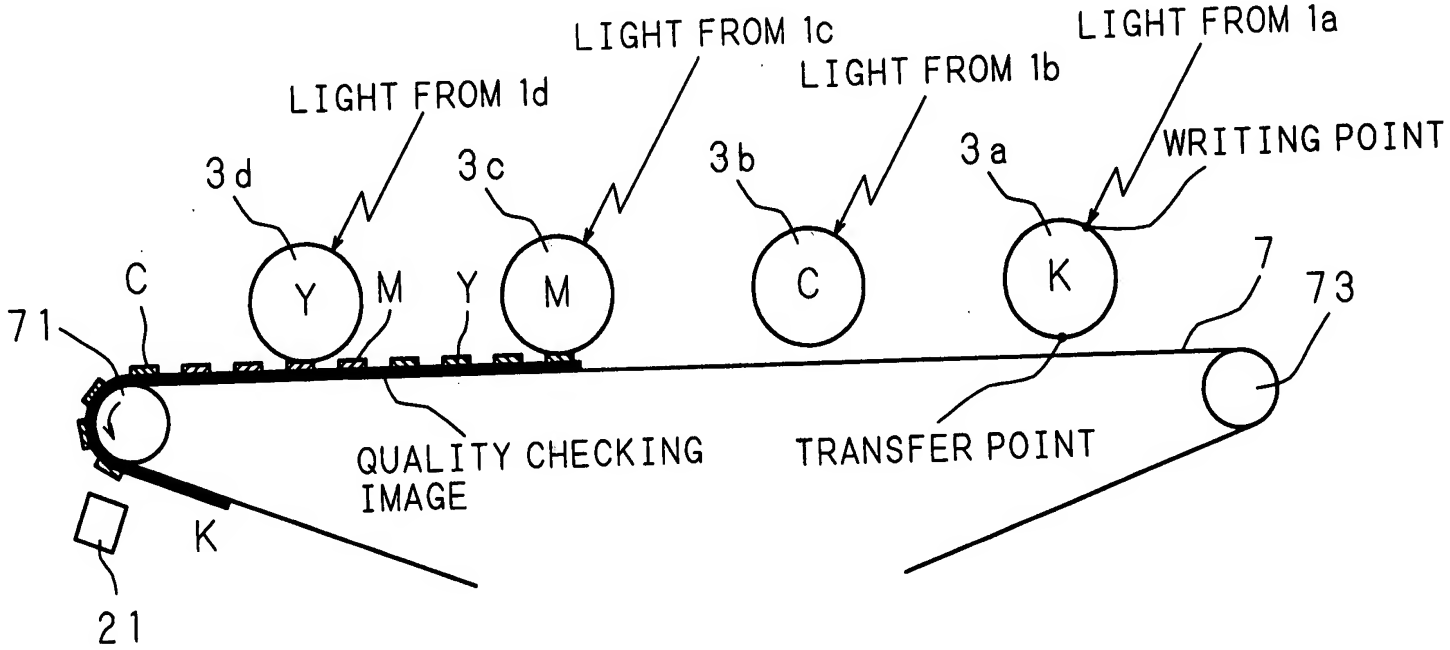

LIGHT FROM 1c
LIGHT FROM 1a
LIGHT FROM 1b
LIGHT FROM 1d
WRITING POINT
3d
3c
3b
3a
C
Y
M
Y
M
C
K
7
73
71
QUALITY CHECKING IMAGE
TRANSFER POINT
K
21

FIG. 21

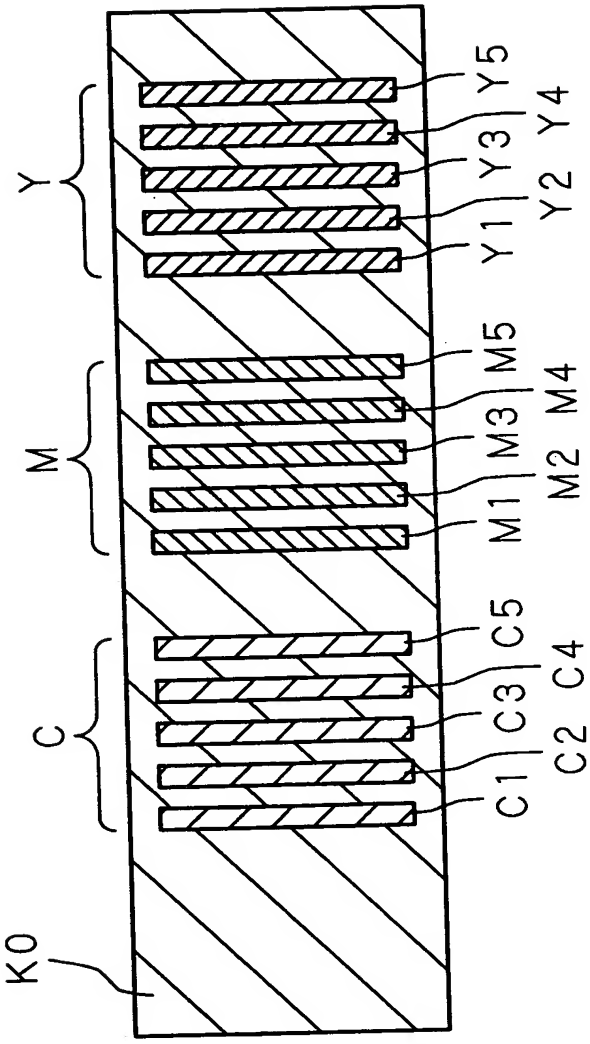


FIG. 22A

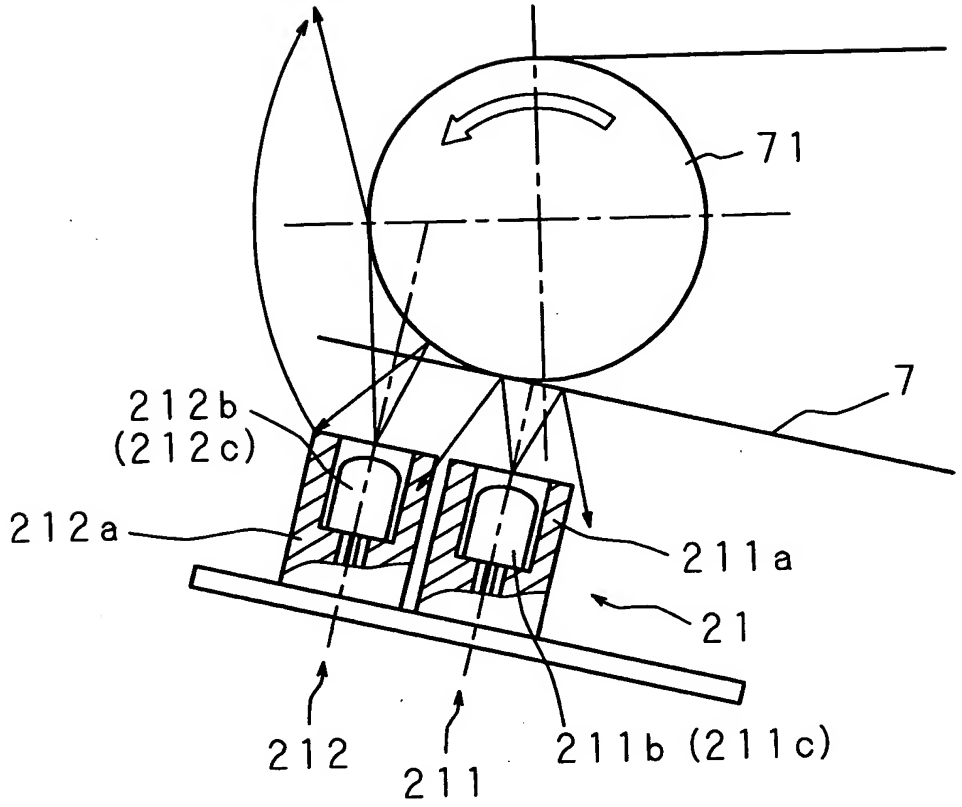



FIG. 22B

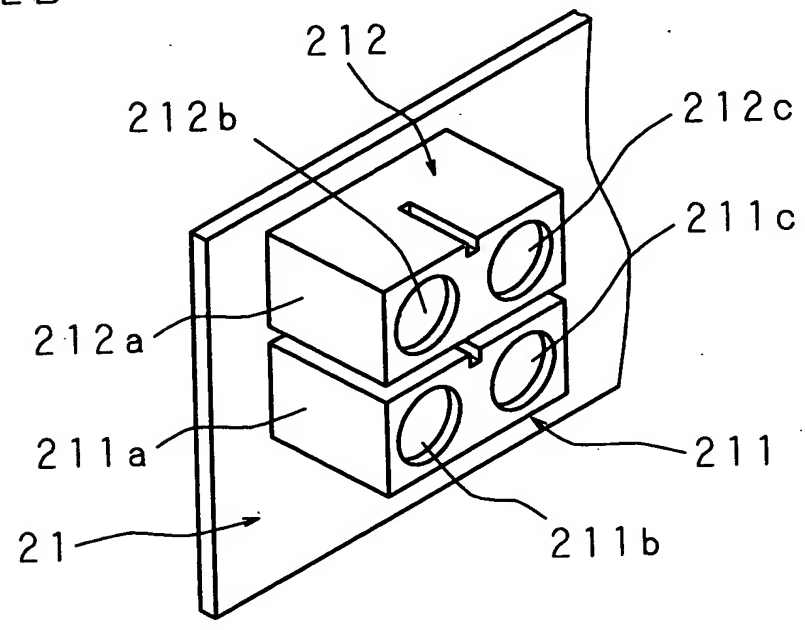


FIG. 23

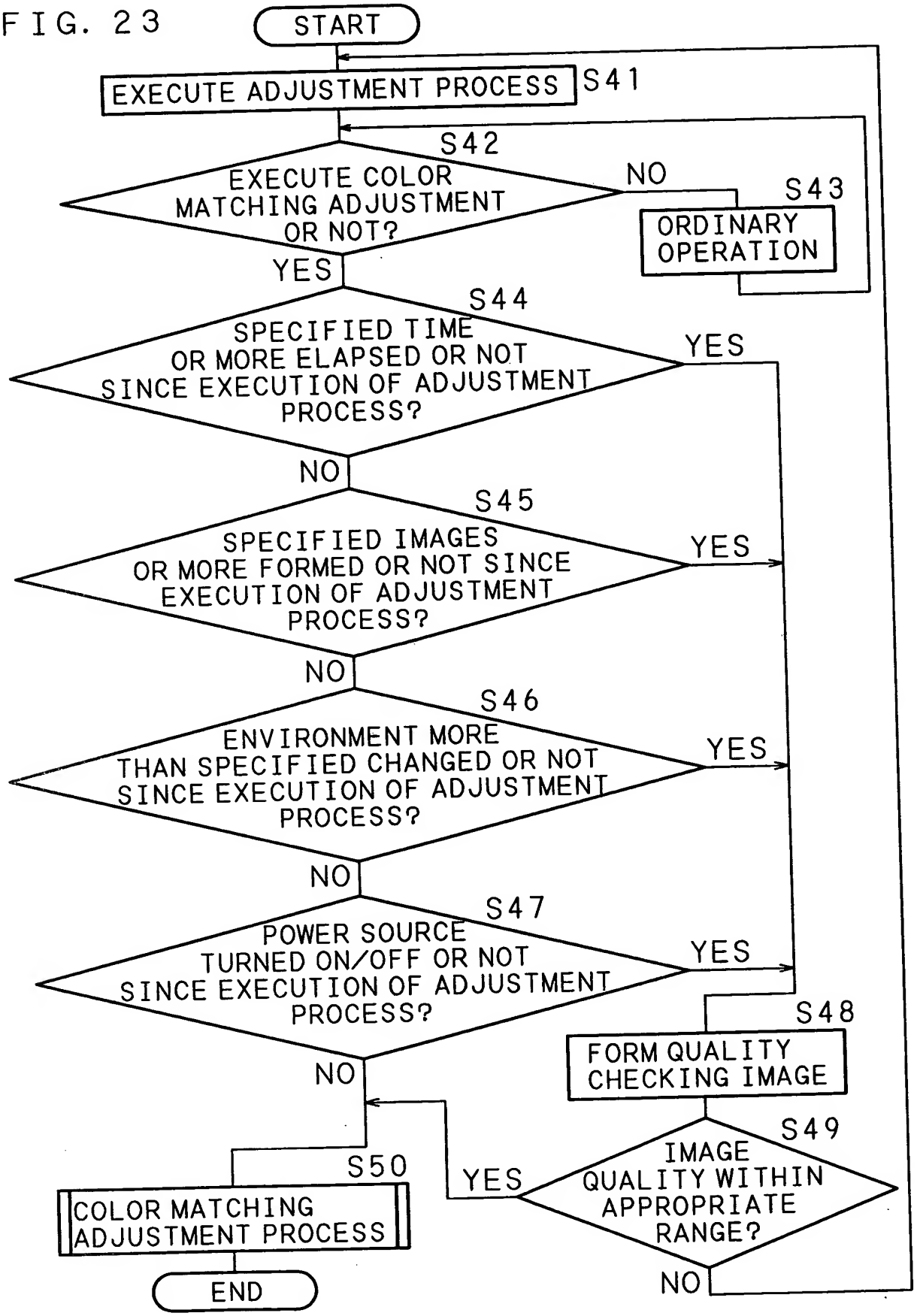

START
EXECUTE ADJUSTMENT PROCESS
S41
S42
EXECUTE COLOR MATCHING ADJUSTMENT OR NOT?
NO
S43
ORDINARY OPERATION
YES
S44
SPECIFIED TIME OR MORE ELAPSED OR NOT SINCE EXECUTION OF ADJUSTMENT PROCESS?
YES
NO
S45
SPECIFIED IMAGES OR MORE FORMED OR NOT SINCE EXECUTION OF ADJUSTMENT PROCESS?
YES
NO
S46
ENVIRONMENT MORE THAN SPECIFIED CHANGED OR NOT SINCE EXECUTION OF ADJUSTMENT PROCESS?
YES
NO
S47
POWER SOURCE TURNED ON/OFF OR NOT SINCE EXECUTION OF ADJUSTMENT PROCESS?
YES
S48
FORM QUALITY CHECKING IMAGE
S49
IMAGE QUALITY WITHIN APPROPRIATE RANGE?
YES
NO
NO
S50
COLOR MATCHING ADJUSTMENT PROCESS
END

FIG. 24

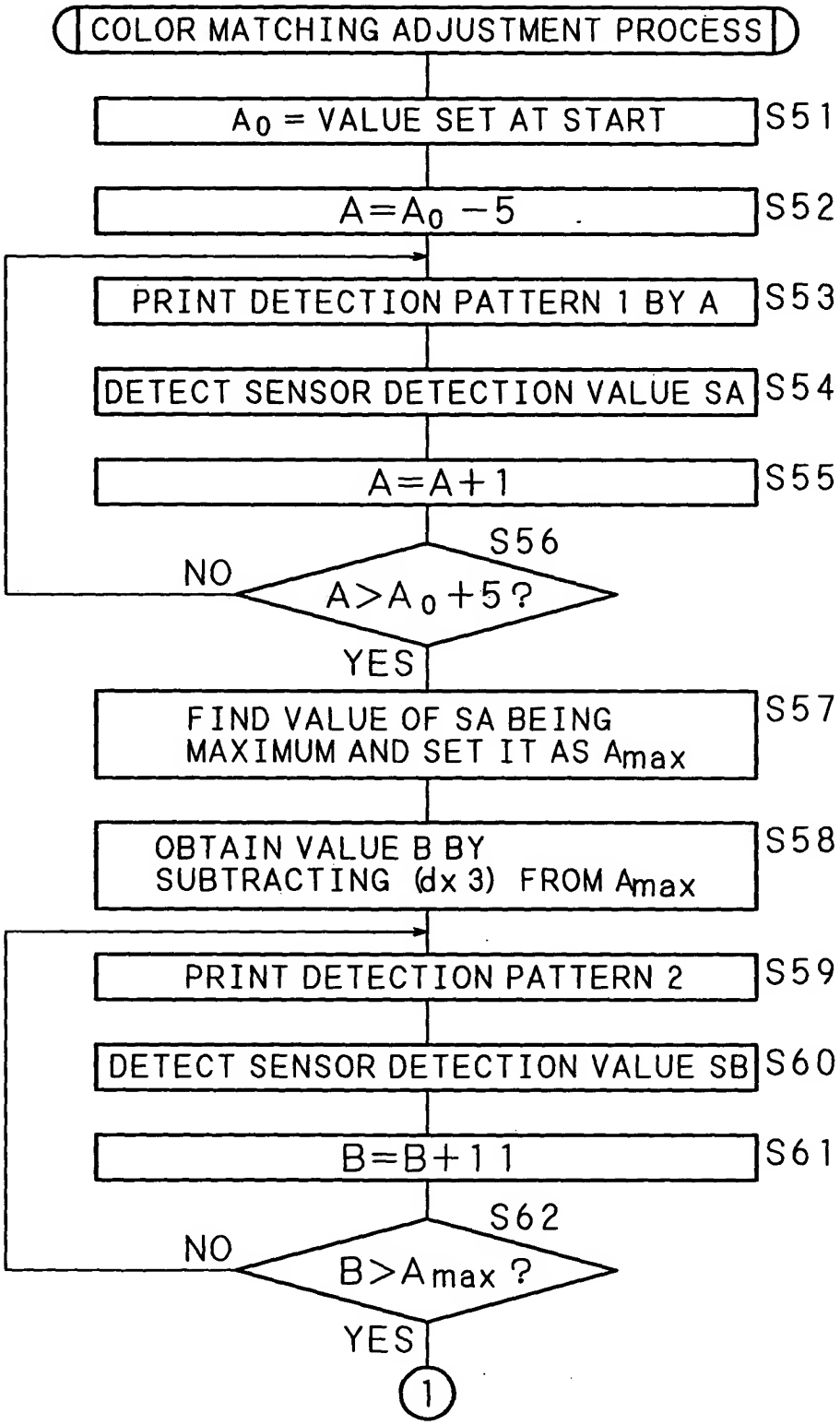
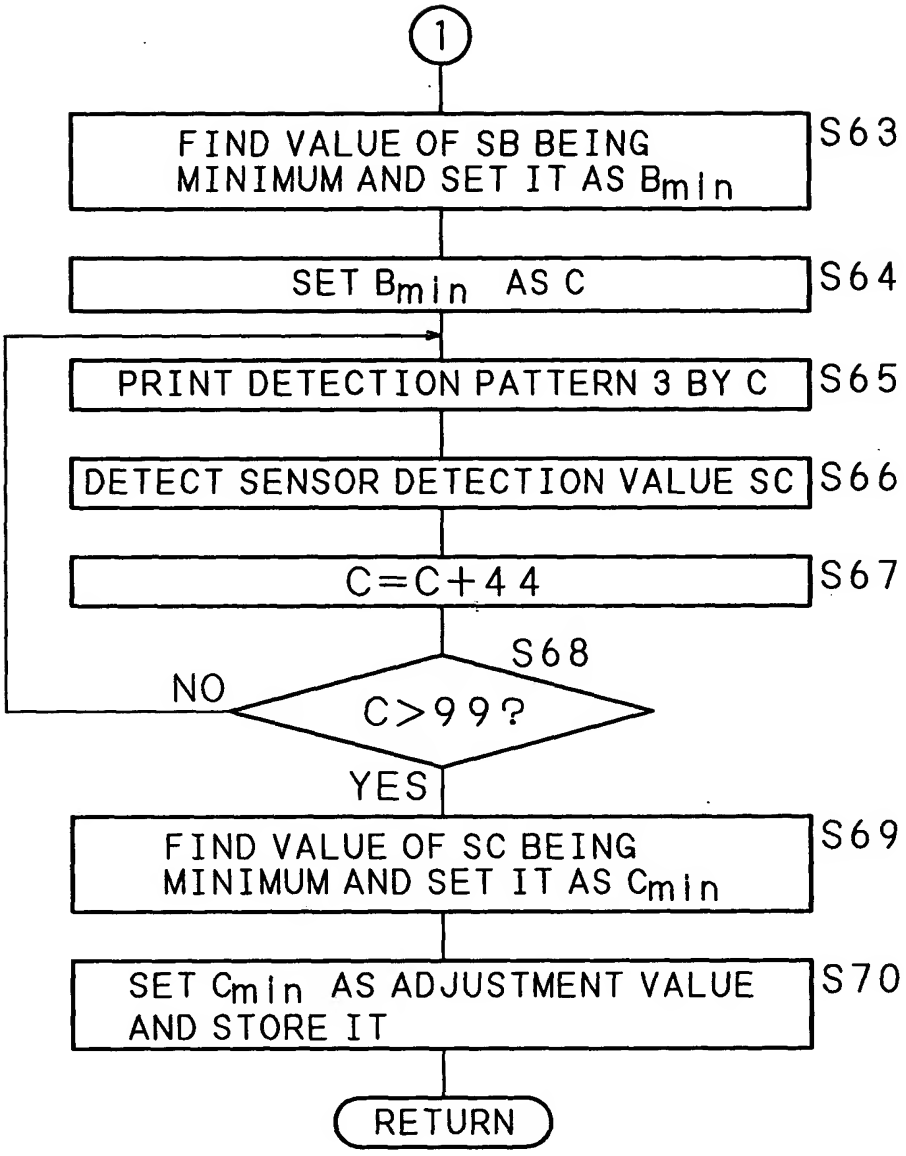

COLOR MATCHING ADJUSTMENT PROCESS
A0 = VALUE SET AT START
S51
A=A0 −5
S52
PRINT DETECTION PATTERN 1 BY A
S53
DETECT SENSOR DETECTION VALUE SA
S54
A=A+1
S55
S56
NO
A>A0 +5?
YES
FIND VALUE OF SA BEING MAXIMUM AND SET IT AS Amax
S57
OBTAIN VALUE B BY SUBTRACTING (dx 3) FROM Amax
S58
PRINT DETECTION PATTERN 2
S59
DETECT SENSOR DETECTION VALUE SB
S60
B=B+11
S61
S62
NO
B>Amax ?
YES
1

FIG. 25


1
FIND VALUE OF SB BEING MINIMUM AND SET IT AS Bmin
S63
SET Bmin AS C
S64
PRINT DETECTION PATTERN 3 BY C
S65
DETECT SENSOR DETECTION VALUE SC
S66
C=C+44
S67
S68
NO
C>99?
YES
FIND VALUE OF SC BEING MINIMUM AND SET IT AS Cmin
S69
SET Cmin AS ADJUSTMENT VALUE AND STORE IT
S70
RETURN